

**The Heavy Battalion Task Force In  
Mountainous Terrain:  
Are Current Tactics, Techniques, and Procedures  
Adequate?**

**A Monograph  
by  
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Armor**



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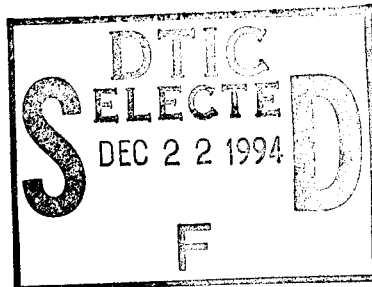
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This study seeks to determine whether current tactics, techniques, and procedures for a heavy battalion task force conducting offensive operations in mountainous terrain are adequate. Many potential crisis spots where U.S. forces could deploy are in mountainous regions. Most potential enemy forces in mountainous areas have a significant armor capability.

The study first defines the environment of mountain warfare and its relevance to a power projection force, such as the U.S. Army. Next, the theoretical foundations of offensive mountain warfare are applied by examining the theories of Jomini and Clausewitz. Then the study examines three historical examples: German armor in the Balkans (1941), U.S. armor operations in Italy (1944), and the use of Soviet armor in Afghanistan (1979-1988). Current tactics, techniques, and procedures for offensive operations in mountains are analyzed using historical observations and the elements of combat power from Field Manual 100-5, Operations.

The study concludes that current tactics, techniques, and procedures for a heavy battalion task force conducting offensive operations in mountainous terrain are inadequate. Changes to current tactics, techniques, and procedures are recommended. Implications on training and the organization of a heavy battalion task force are discussed.

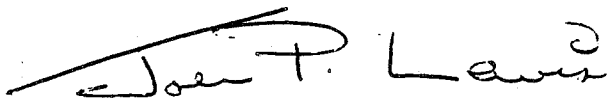
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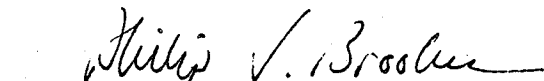
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## **I. INTRODUCTION**

In the post-Cold War world there are many potential crisis spots where U.S. Army units could deploy. One possible area is the former Yugoslavia, where mountains and hills cover nearly eighty percent of the land area.<sup>1</sup> Mountainous terrain limits the deployment of major ground forces and fragments operations into a series of small unit battles fought primarily at the battalion level.<sup>2</sup> Nearly every major U.S. Army combat operation in mountainous terrain from World War II to the present has included armored forces. However, current U.S. Army doctrine ignores any role for armored forces in mountainous terrain.

Not surprisingly, current U.S. tactics, techniques, and procedures (TTPs), which translate doctrine into action discounts a role for armor in mountainous terrain. However, can a heavy battalion task force deployed to the former Yugoslavia, as a part of a mechanized brigade and division, be an effective fighting force? The lack of ground mobility and firepower in the absence of tanks and Bradleys (BFVs) in restrictive terrain, is an unfortunate and painful lesson learned from Somalia.<sup>3</sup> It is a tragic lesson the U.S. Army cannot afford to duplicate in the restrictive and mountainous terrain of the Balkans.

This study focuses on the offensive employment of a heavy battalion task force in mountainous terrain. The evidence includes both theory and historical examples of armored operations in mountainous terrain. The study applies an analysis of current U.S.

Army tactics, techniques, and procedures for offensive armor operations in mountains using historical observations and the elements of combat power from Field Manual (FM) 100-5, Operations --- maneuver, firepower, protection and leadership.<sup>4</sup> Based on the conclusions from this analysis the study will make recommendations for current tactics, techniques, and procedures for a heavy battalion task force in a mountainous region.

## **II. THE ENVIRONMENT OF MOUNTAIN WARFARE**

There are many definitions of what exactly makes up mountainous terrain. This study will define mountainous terrain as a land area with a marked difference in elevation with steep slopes and valleys over an extended area. It may include built-up areas and plains between mountains, ridges, plateaus, and passes.

Mountainous terrain as defined occupies fifty percent of the world's land area.<sup>5</sup> In addition to the former Yugoslavia, nearly every potential crisis spot for U.S. forces has mountainous terrain.<sup>6</sup>

Although the geography of mountains is extremely complex, U.S. Army doctrine divides mountainous terrain into three basic groups: alpine ranges, coastal ranges, and interior ranges.<sup>7</sup> Alpine ranges, typified by the Alps of central Europe and the Andes of South America, contain high rugged peaks and meadows or plateaus that extend well above the regional snow line. Alpine peaks are normally unclimbable except by the most experienced climbers.<sup>8</sup> Historically, armored forces cannot operate in this terrain.



Coastal ranges have less relief than other types of ranges. Most peaks do not rise above the timberline.<sup>9</sup> Examples of coastal ranges include the Shouf Mountains in Lebanon and the mountains of western Saudi Arabia. Roads and railways are few. Armored forces can operate in coastal ranges.

Interior ranges cover large land areas and are less formidable than alpine and coastal ranges. They are normally complex and incorporate a variety of land forms. Their valleys are normally below the timberline and historically serve as invasion routes.<sup>10</sup> The Blue Ridge Mountains in the U.S. and the Harz Mountains in Germany are examples of interior ranges. During spring thaws or heavy rains, rivers and streams may become deep, swift torrents. Roads and railways in this terrain normally follow the valleys. Armored forces can operate in interior ranges.

There are three distinct levels in the interior and coastal ranges: (1) the lowest level, formed by the bottoms of valleys, is where tanks and mechanized infantry can easily move; (2) the intermediate level or terrace zone with intermittent minor roads and trails which allow restricted movement for vehicles; and (3) the uppermost level or summit zone where movement with vehicles is practically impossible.<sup>11</sup>

In addition to terrain, both climate and weather influence mountain warfare. An almost endless variety of local climates exists within mountainous regions. Conditions change markedly with altitude, latitude, and exposure to atmospheric winds and air masses. The severity and variance of the weather causes it to have a significant impact on military operations.<sup>12</sup>

The environment of mountain warfare is important to a power projection force such as the U.S. Army. Mountainous terrain covers nearly fifty percent of the world's land mass including many possible U.S. crisis spots. Most potential U.S. enemies in mountainous regions have armor in their order of battle.<sup>13</sup> U.S. vital interests requires well trained light and heavy forces that are capable of operating in mountainous terrain. Only units with adequate training and equipment for mountain warfare will cope successfully with both the numerous environmental conditions and a determined enemy.<sup>14</sup>

### **III. THE THEORY OF MOUNTAIN WARFARE**

Two prominent 19th century military theorists, Antoine Henri Jomini and Carl von Clausewitz wrote about mountain warfare. Both agreed that maneuvering in mountainous terrain is difficult. Both also agreed that the attacker as well as the defender has advantages and disadvantages. Many of their ideas are still applicable today.

Jomini believed that conducting an offensive against a mountainous country presented two cases: (1) an offensive against a belt of mountains beyond which are plains or (2) the whole theater may be mountainous. In the first case an attacker could feint upon the whole line of the frontier to induce the enemy to extend his defense, then force a breakthrough. In the second case he believed that attacking a mountainous country was a more difficult task. Fields of battle for the deployment of large units were rare and the

war would become a succession of partial combats. Key terrain would be the ridges which separated valleys.<sup>15</sup>

Controlling the trails and roads which crossed these ridges were important missions for light infantry. Jomini believed that a small force could effectively defend against a larger attacking force at a specific point in a mountainous region such as a pass, defile, or mountain peak. However, he also believed that over a larger area the advantage shifts to the attacker. He wrote that the defender must cover all possible avenues of approach. When an attacker strikes a decisive point a defender faces great difficulties in making the marches required to cover the menaced points.<sup>16</sup> Jomini concluded his thoughts on mountain warfare with three principle rules for commanders: (1) Do not risk oneself in the valleys without securing the heights; (2) operations should orient on the lines of communication (LOCs) of the enemy, and (3) a mobile defense is the best means of defending.<sup>17</sup>

In his book On War, Carl von Clausewitz dedicated four chapters to mountain warfare. According to Clausewitz mountainous terrain clearly favors the defender. However, mountainous terrain also tends to produce paralysis in the defender. Three factors caused this to occur. First, there are no roads to allow rapid marching from the rear to the front. Even a sudden counterattack has problems due to the uneven nature of the ground. Secondly, mountainous terrain makes it virtually impossible for a defender to keep an attacker under constant observation on all roads and obscure mountain trails. Thus, the attacker could gain similar advantages of terrain that normally

belonged to the defender. The third factor is the defender's constant risk of having his line of retreat cut off by the attacker.<sup>18</sup>

In attacking in mountainous terrain, Clausewitz recommends distinct methods of attack which depend on the enemy's dispositions. He recommends that an attack should proceed on several roads from the start, or on a broader front due to the nature of mountainous terrain. When attacking a widely extended defense in mountains the attacker should concentrate his forces and try to create a penetration at one or a few other points. When attacking a concentrated mountain defensive position, the attacker should outflank the defender. Clausewitz warns, however, that the flanking operations must aim at actually cutting off the enemy forces instead of wasteful tactical assaults against enemy flanks or rear.<sup>19</sup>

Cutting off a defender's line of retreat is key to the Clausewitzian view of offensive success in mountain warfare. He believed the fastest way of getting results is always to give the enemy a fear of having his line of retreat cut. Mountain warfare arouses that fear more quickly and effectively. Due to extremely limited routes of withdrawal, there is no easy way for a defender to withdraw. A simple demonstration or feint towards a defender's line of retreat is usually not enough. An attacker must therefore aim at really cutting a defender off.<sup>20</sup>

In a tactical sense, modern mountain warfare differs little from what Clausewitz and Jomini wrote. The terrain problems that Clausewitz and Jomini noted have not changed significantly except that roads and trails may have improved. Light infantry is still a

great asset due to the rugged terrain in mountain warfare. Movement for ground forces will always be difficult and restrictive.

Mountainous terrain will nearly always favor the defender against an attacker with a power projection force. Theoretically, the defender, within his nation-state, has the chance in peacetime to study his mountainous terrain intensively so he can prepare for the strongest defense possible. To an attacker from outside of a nation-state every valley, ridge, and pass is new. The attacker has to move and expose himself constantly to attack, while the defender can maximize his prepared and hidden positions.<sup>21</sup>

A major change in mountain warfare since the 19th century is the development of technology such as helicopters and armored vehicles. The offensive use of helicopters can have a decisive effect on mountain mobility. The use of combat and transport helicopters can multiply the possibilities of operations and increase their tempo.<sup>22</sup>

Armored forces can also contribute to mountain warfare. In the defense, armored forces provide long range firepower and target acquisition assets to reinforce infantry positions. Armored forces can also add mobility to the defense. Offensively, when terrain permits, armored forces can reinforce assault groups consisting of infantry, engineers, and scouts. Approaching under cover of darkness, tanks and Bradley fighting vehicles (BFVs) can use thermal sights to provide accurate direct fire support to infantry units. Other uses of armored vehicles in mountainous terrain include reconnaissance of valley roads, transport of troops, an anti-tank role, direct fire support to infantry, and evacuation of wounded.

Many of the ideas of both Clausewitz and Jomini still apply today. Integrated heavy and light forces can easily adhere to Jomini's three principles. Light infantry secures the heights as armored forces attack through the valleys and orient on enemy lines of communication. Armored forces will also add to Jomini's concept of a mobile mountain defense. Both of Clausewitz's methods of attacking in mountains apply today. The use of armor on a broad front employing several routes and as a penetration force supports Clausewitz's two distinct methods of attacking in mountainous terrain. The employment of heavy forces to cut off an enemy's line of retreat is also a modern application of Clausewitz's theory.

Theory reinforces the use of integrated heavy and light forces in mountainous terrain. Integrated heavy and light teams and task forces can have a decisive impact in offensive mountain warfare. A look at the historical use of armor in offensive operations in mountainous terrain will illustrate this and also help bring theory into reality.

#### **IV. THE HISTORICAL USE OF ARMOR IN OFFENSIVE MOUNTAIN OPERATIONS**

There are many examples of the offensive use of armor in mountainous terrain during and since World War II. This study examines the following three historical examples: German armor in the Balkans (1941), U.S. armor in Italy (1944) and Soviet armor in Afghanistan (1979-1988). Theory and history confirm that armor

can play an important role in offensive operations in mountainous terrain.

### **Armor in the Balkans**

The invasion of Greece (April 1941) was one of the first operations in which Germany employed panzer [tank] divisions and motorized infantry units in distinctly mountainous terrain. Despite the difficulties encountered, the commitment of armor to spearhead an attack through mountains proved to be sound tactics during this particular campaign.<sup>23</sup> Two major successes during the first phase of the Greek campaign: the seizure of Skopje, Yugoslavia and the quick capture of Thessalonike, Greece could not have been accomplished without panzer [tank] divisions.<sup>24</sup> The actions of the 3d Panzer Regiment commanded by COL Herman Balck is typical of the German Army's innovative use of armor in the campaign.

In April 1941, the German plan called for a penetration of the Greek-fortified Metaxas Line by German mountain and infantry divisions. Simultaneously, the 2d Panzer Division, to which Balck's 3d Panzer Regiment belonged, was to outflank this position using extremely poor roads. Then, they were to drive to Thessalonike. By 7 April the Metaxas Line had already been broken at several points and two days later the 2d Panzer Division occupied Thessalonike.<sup>25</sup>

On 14 April 1941, 2d Panzer Division crossed the Aliakamon River near the river bend and reached the town of Katerina. This occurred about three hours before 9th Panzer Division captured the town of Kozani on the west side of the Vermion Mountains.<sup>26</sup> Due to the formidable terrain surrounding Mount Olympus and with the

Allied army hard-pressed, 2d Panzer Division split into two battle groups. Balck commanded the left flank (eastern) battle group.<sup>27</sup>

Balck's battle group advanced through Katerina and on the night of 14 April met stiff resistance at Platamon Ridge.<sup>28</sup> The 21st Infantry Battalion, of the 2d New Zealand Division held the ridge. A ruined castle dominated the ridge across which the coastal pass led to Platamon (see Figure 1).

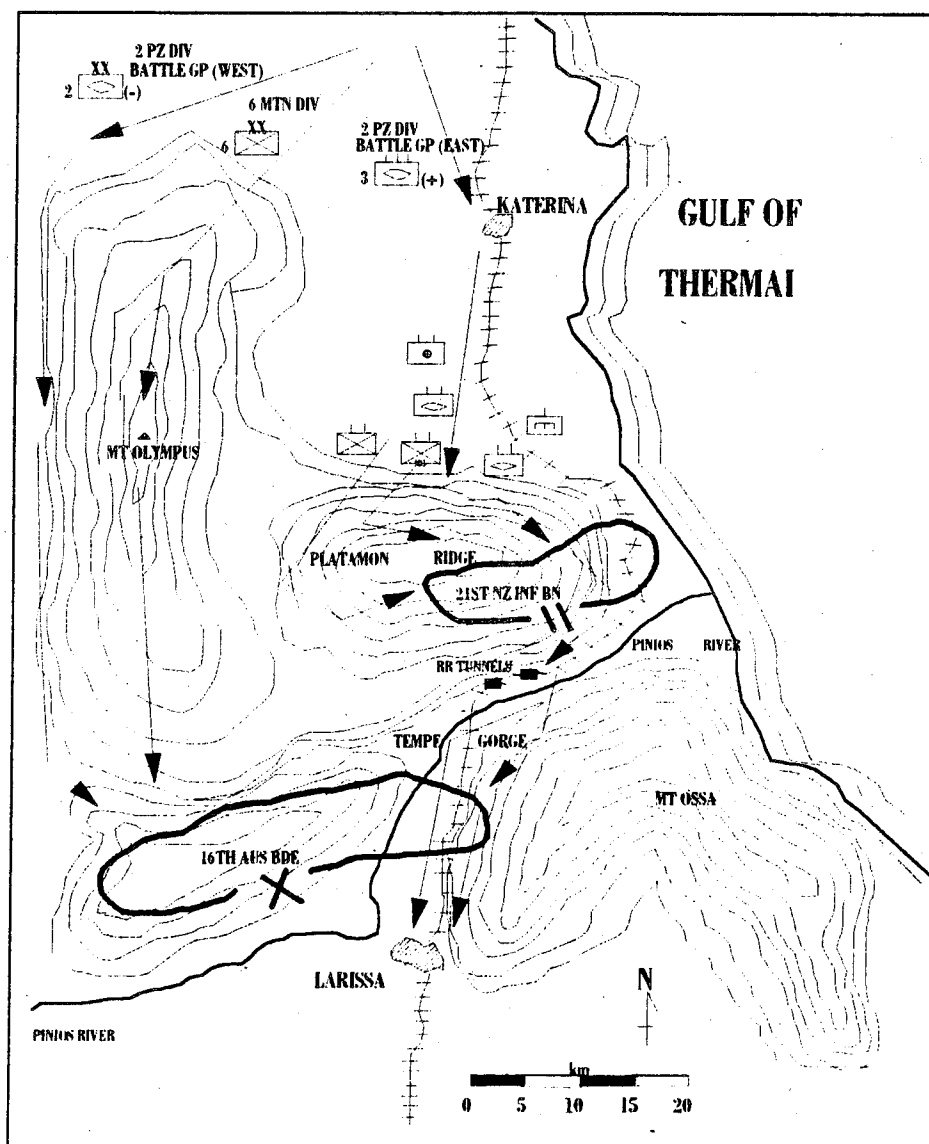


Figure 1: Balck's Attack from Katerina to Larissa, 1941.



The 21st (NZ) Infantry Battalion Commander thought that the terrain ahead of his positions was entirely unsuitable for tank movement, and that he need only expect infantry attacks. On 15 April, Balck's 2d Motorcycle Battalion supported by a tank battalion conducted a piecemeal attack against the ridge. The piecemeal attack surprised the New Zealander defenders, but the defenders still repelled the German attackers.<sup>29</sup>

Balck quickly moved up reinforcements consisting of an infantry battalion and an engineer company. The deeply broken terrain, covered with thick brush was unsuitable for armor. The tanks were roadbound and reconnaissance revealed mines on the road up ahead. Balck personally conducted a leader's reconnaissance. Following his reconnaissance, he sent the motorcycle battalion (without their motorcycles) on a wide flanking movement to the west. He sent the infantry battalion on an even wider flanking movement to the west through difficult mountainous terrain. This left only the engineer company to serve as close-in security for the German tanks and field artillery at night.<sup>30</sup>

On the morning of 16 April, the motorcycle battalion hit the New Zealand left flank and the German infantry battalion attacked their rear. Simultaneously, Balck ordered the German tanks to avoid the mined road and move through the 'impassable terrain' and frontally attack the ridge. The simultaneous frontal and flank attacks forced the 21st (NZ) Infantry Battalion to flee south. The New Zealanders moved to defensive positions anchored on the Pinios River.<sup>31</sup>

Due to the terrain and fatigue, from moving over mountainous terrain all night, the German infantry was unable to pursue the New

Zealanders. The German tanks tried to pursue but were unable to get down the south slope of the Platamon Ridge.<sup>32</sup> It proved nearly impossible to move tanks and wheeled vehicles along an unimproved cart trail which served as a road.<sup>33</sup> German combat engineers slowly opened the road using explosives. It took hours to tow the tanks over the ridge. Due to this time consuming process, only thirty German tanks were available on the morning of 17 April.<sup>34</sup>

Two German tank companies moved south and reached the Tempe Gorge by late morning on 17 April. The Tempe Gorge was a narrow gorge with high vertical mountain walls on either side and the Pinios River rushing in the middle. On the northern bank of the river paralleled a railway and a road snaked along the southern bank. There were no bridges across the river.<sup>35</sup>

At this point, COL Balck reached a logistical decision point. He realized that it would be nearly impossible to evacuate wounded soldiers back across the Platamon Ridge or send fuel forward to his tanks until the road junction at Larrisa was in German hands. His staff even considered bringing five gallon cans of fuel by boat up the Pinios River and then off-loading them onto oxen and donkeys. German boats would have been vulnerable to artillery fire by the Allies on the southern side of the river. Balck disapproved the boat plan in favor of air transport. However, air drops only partially alleviated Balcks' supply problems.<sup>36</sup>

Reconnaissance operations disclosed an open single railroad tunnel; the Germans then sent a tank company up the railway line on the northern bank of the river. Unfortunately, after slowly moving through the first tunnel, the lead tank discovered that the Allies

blocked the second railroad tunnel. It took a considerable amount of time to retrieve the tank company. Meanwhile, reconnaissance parties found an island in the middle of the Pinios River. Balck boldly decided to take a risk. He ordered one tank to try to ford the river. The tank made it across. Two more tanks successfully crossed. Each tank took between thirty and sixty minutes to cross the river. By nightfall, the first German tanks crossed the river under heavy Allied fire.<sup>37</sup>

About twenty tanks crossed the Pinios River between 17 and 18 April. The tanks that made the crossing faced new hazards as they steered around crater obstacles, smashed through road blocks, and endured constant shelling from the 16th Australian Brigade.<sup>38</sup> Some tanks became bogged down in a swamp while trying to bypass a road demolition.<sup>39</sup>

Balck's advance across terrain regarded as impassable to armor decided the issue. German tanks supported by infantry soon broke into open country and advanced on Larissa. Under pressure from 2d Panzer Division's western battle group, the German 6th Mountain Division, and Balck's battle group, the Australians and New Zealanders withdrew and at dawn on 19 April 1941 the Balck battle group entered Larissa.<sup>40</sup>

An official New Zealand after action report described Balck's actions as follows:

Seldom in war were tanks forced through such difficult country, or had foot soldiers, already with over five hundred kilometers marching behind them pushed

forward so rapidly under such punishing conditions; it was a record of which any soldier could be proud.<sup>41</sup>

The concentrated German armor-infantry attack across the Pinios River illustrates Clausewitz's theory of attacking an extended defense with a concentrated force. The concentrated German force penetrated the extended Allied defense along the Pinios River and threatened the Allied line of retreat. The fear of losing their line of retreat forced the Allies to withdraw.

The Allied defense is an example of Jomini's theory on the utility of conducting a mobile defense in mountain warfare. The 21st (NZ) Battalion's ability to conduct a mobile defense allowed them to withdraw and delay Balck's battle group. A purely stationary defense could have allowed the German forces to surround the position and forced the 21st (NZ) Battalion to surrender.

The German operation in the Balkans also illustrates the need for combined arms teams in mountainous terrain. Colonel Balck's attack shows the advantages of moving armored forces through mountainous terrain, where they are least expected. The failure of Balck's scouts to detect the blocked second tunnel reinforces the importance of a thorough reconnaissance before committing armor in restrictive terrain. Balck's logistic problems illustrate some of the logistical considerations for armored operations in mountains. The example also illustrates the type of bold and audacious leadership required for successful offensive armored operations in mountains.

### Armor in Italy

During operations in Italy (1943-45), the U.S. Army deployed one armored division and at least eight separate tank battalions in theater.<sup>42</sup> The attack by Combat Command B, 1st Armored Division in the Apennines from Grossetta, Italy to the Cecina River (22-30 June 1944) is typical of U.S. armored operations in Italy.

The terrain from Grossetta to the Cecina River was mountainous, laced by streams and deep gorges. There were only a few trafficable roads. Nearly every mile had its share of bridges and culverts, which the German defenders consistently demolished. The roads twisted around hills and mountains. Each road curve, with its blown bridge or culvert, became an excellent site for German road blocks and ambushes.<sup>43</sup>

In attacking north, the 1st Armored Division faced the problem of covering a zone whose width was over twenty miles. The zone lacked enough routes and off-road areas for the doctrinal employment of armor. 1st Armored Division's solution to the problem was to divide the zone between its two combat commands (brigade-size units). The division placed Combat Command B in the west, Combat Command A in the east and Combat Command R (reserve) in the center.<sup>44</sup>

Combat Command B, commanded by Brigadier General Frank A. Allen consisted of a medium tank battalion (equipped with 75mm M4-series Sherman tanks), a light tank battalion (equipped with 37mm M5-series Stuart tanks), two armored infantry battalions, one tank destroyer company (equipped with 75mm M10 tank destroyers),

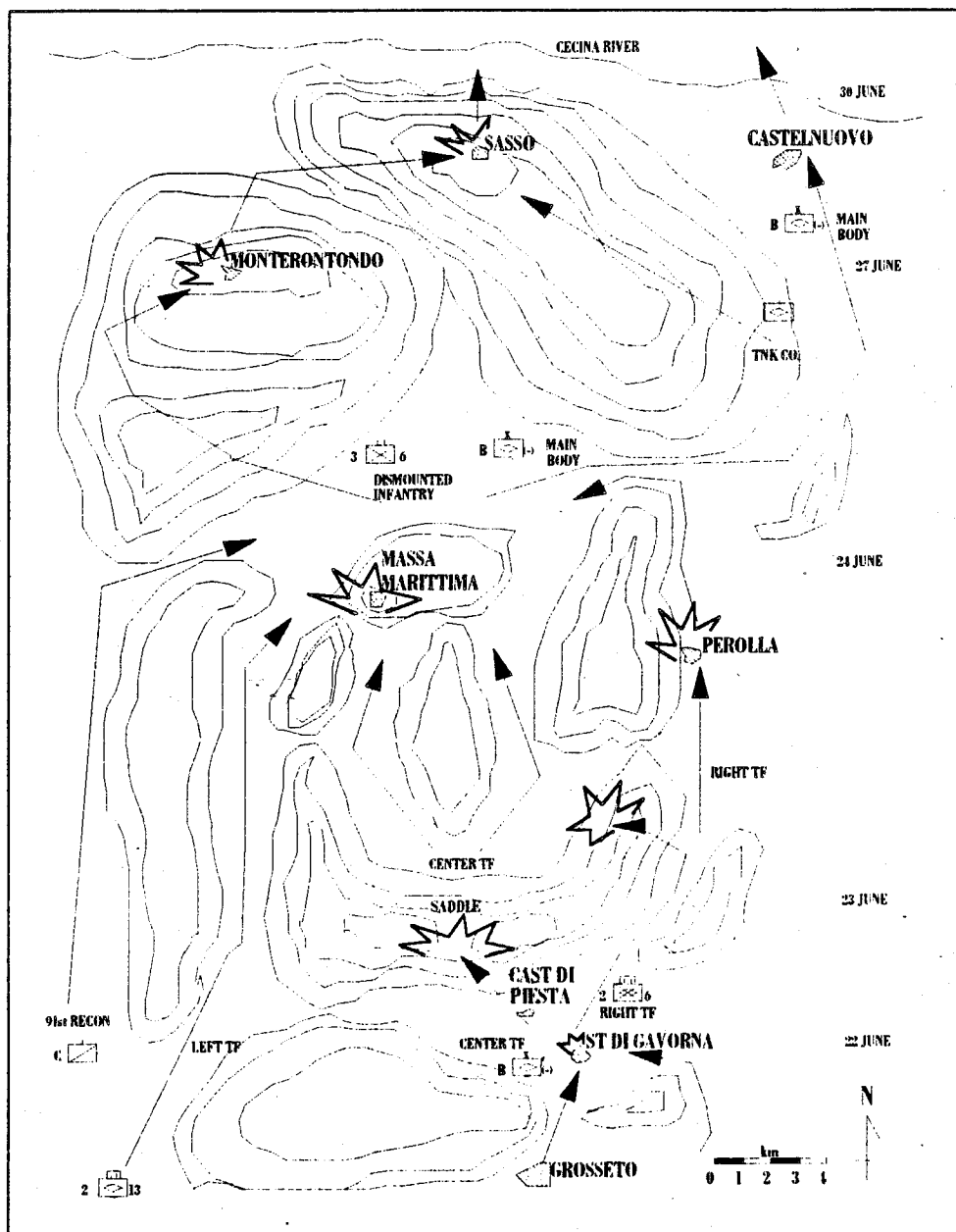
one armored engineer company, a reconnaissance company, and two armored field artillery battalions.<sup>45</sup>

Brigadier General Allen task organized his combat command into three task forces. On the left, the task force consisted of a light tank battalion (-), an armored infantry company, and a medium tank company. The center task force included the medium tank battalion (-), an armored infantry battalion, and a reconnaissance company (-). The two armored field artillery battalions moved behind the center task force. In the right task force Allen placed an armored infantry battalion (-), a company of light tanks, and a platoon of medium tanks.<sup>46</sup>

Allen based the task organization on his assessment of the superior roads available to the center task force and the suspected concentration of German armor in the center zone. The left and right task forces were weaker but more mobile based on Allen's assessment of the road network. Each of the three task forces included an engineer platoon, a tank destroyer platoon, and a reconnaissance platoon.<sup>47</sup>

At 0530 on 22 June 1944 the three Combat Command B task forces attacked in zone. Advancing slowly against stiff opposition from elements of the German 162d Infantry Division and tanks from the 3d Panzer Grenadier (Mechanized) Division until forced to halt at 1350 hours in the vicinity of St. di Gavorano. Following a hard fight in the center, in which the Germans lost three Mark IV tanks, Combat Command B advanced to Cast di Pietsa by nightfall (see Figure 2).<sup>48</sup>

On 23 June Combat Command B continued to attack in zone. The center task force moved off of Highway 1 and turned north into the



**Figure 2: Combat Command B's Attack to the Cecina River, 1944.**

mountains on the road to Massa Marittima. Two kilometers north of the highway the center task force had to pass through a narrow

saddle. On the far side of the saddle, distributed across a small plain, nine Mark VI (Tiger) tanks waited. As the center task force tanks crossed the rise, the Tiger tanks struck. In the ensuing battle the Germans lost several Tiger tanks. However, the Germans retained control of the strong defensive position.<sup>49</sup>

To relieve pressure on the center task force, Allen ordered the right task force to create a demonstration northeast of the saddle. Moving quickly, the right task force encountered few demolitions or mines and only slight enemy resistance until its light tank company moved into the open. Leading with light tanks, the right task force drove into an ambush by ten German tanks (four Mark IVs and six Tigers) supported by infantry along a small road five kilometers east of the center task force.<sup>50</sup>

The right task force's light tanks were no match for the German tanks. The Germans destroyed the tank destroyer platoon and twelve light tanks. The remaining light tank platoon hastily withdrew to a blocking position three kilometers to the rear set up by an infantry company from the task force. The demonstration did not effect the main German defensive position guarding the saddle that faced the center task.<sup>51</sup>

The center task force continued to fight a savage battle with the German defenders. Due to the strength of the fortified German position in the saddle, BG Allen ruled out a frontal assault. His left flank task force was unable to provide help due to the compartmentalized terrain in the west.<sup>52</sup>

Aerial photographs showed a faint trail to the left of the center task force. The trail did not look like a route suitable for tanks so



Allen sent a reconnaissance platoon reinforced by a tank destroyer platoon over the trail. Amazingly, the Germans left the trail unguarded, apparently relying on 'impassable terrain' for flank protection. Under cover of darkness, Allen reinforced his reconnaissance element with an infantry company and medium tank company.<sup>53</sup>

By the morning of 24 June the reinforced flanking force reached high ground overlooking the saddle. Concentrated direct fire, plus well placed artillery fire from Combat Command B's two artillery battalions destroyed three more Tiger tanks.<sup>54</sup> Vehicle losses and the threat against the German line of retreat forced the Germans to withdraw. Combat Command B main body (center) then moved to within sight of the town of Massa Marittima. Jomini's principle of securing the heights before moving through a valley became evident to BG Allen. Based on the losses incurred during the battle the previous day, BG Allen decided that a thorough dismounted reconnaissance would precede all future movement over mountainous terrain.<sup>55</sup>

Combat Command B continued to attack north towards Massa Marittima. The right task force met heavy enemy resistance at Perolla, about five kilometers southeast of Massa Marittima. After a careful reconnaissance, the right task force scouts found a bypass for the medium tank platoon and remaining light tank platoon to use to go around the town. The right task force conducted a coordinated attack with its tanks moving east and the infantry circling west. This forced the German defenders to withdraw.<sup>56</sup>

Simultaneous with the right task force's fight, the left and center task forces were fighting to seize Massa Marittima. The left task force approached on the main road to Massa Marittima. Due to the terrain, Allen split the center task force into two smaller forces. He sent one of the smaller forces over an unimproved, narrow road. While the other force, setting off across gullies and streams, made its trail as it went. Combat Command B received attachment of C Troop, 91st Reconnaissance Squadron earlier in the day. BG Allen sent C Troop around to the west of the left task force to threaten the rear of Massa Marittima.<sup>57</sup>

The combined pressure of the reconnaissance troop, the left task force, the two center columns, and the right task force movement after the fight in Perolla forced a German withdrawal from Massa Marittima. Allen used Clausewitz's broad front principle against the concentrated German defense position. The appearance of five columns to their front, flanks and threatening their rear was just too much for the German defenders. The Germans did not have enough forces to conduct an adequate defense of all five approaches.<sup>58</sup>

After moving through Massa Marittima on 24 June, reconnaissance elements discovered that the left task forces' zone had no more roads or passable trails for nearly sixteen kilometers. Enemy forces also occupied the hills in the left task force zone and could easily interdict the main body in the center. Before moving north, Combat Command B had to deal with the serious threat on its left flank.<sup>59</sup> Allen fully understood Jomini's principle of not risking a force in the valley without securing the heights. BG Allen decided to dismount his center task forces' armored infantry battalion and

send them northwest of Massa Marittima. The main body in the center, with its road-bound tanks, slowly moved forward as the dismounted infantry secured the heights in the western zone.<sup>60</sup>

Forced to leave their vehicles behind, the dismounted infantry battalion began to experience supply problems. Luck and the ability to move fast and aggressively enabled the dismounted infantry battalion to surprise a German battery of horse drawn artillery. The infantrymen captured forty-five personnel, the guns and several horses. The resourceful infantrymen used the captured horses to solve their supply transport problem until they reached Monterotondo, thirteen kilometers north of Mass Marittima. The infantry reached Monterotondo on the night of 27 June.<sup>61</sup>

Continuing to attack north throughout the night, the infantry battalion completely exhausted itself upon reaching the outskirts of Sasso. The canalized approaches to Sasso strengthened the concentrated German defensive position around the town. The infantry battalion commander sent word to BG Allen that he could seize Sasso, but could not hold the town without tank support.<sup>62</sup> BG Allen sent a company of medium tanks. Since no lateral roads or even trails existed, the company of tanks picked its way over 'impassable' mountainous terrain and reached Sasso intact and on time.<sup>63</sup>

Following the successful assault on Sasso, Combat Command B advanced downhill against the German Cecina River defenses. The Combat Command B tanks slowly moved in the center, alternating between mule trails and no roads to get to the river. Once the tanks arrived, the attack moved rapidly and on 30 June Combat Command

B seized Castelnuovo and then established a bridgehead on the north bank of the Cecina River.<sup>64</sup>

Combat Command B's attack illustrates both the merits and drawbacks of Clausewitz's theory of attacking along several routes in mountains. An advantage to moving along several routes is the enemy's inability to defend every avenue of approach with strength. Combat Command B's use of five different routes to overwhelm the German defenders at Massa Marittima illustrates this. A disadvantage to using several routes in compartmentalized terrain is the possible lack of mutual support between units. Allen's left task forces' inability to support the center task force during the fight against the German tanks defending the saddle (23-24 June 1944) is a good example of this. The withdrawal of the German tanks defending the saddle, due to the threat against the German rear, illustrates Clausewitz's theory of always orienting on a defender's line of retreat. Allen's decision to secure the hills in the left task force zone before moving the center task force is a clear example of Jomini's belief in securing the heights before moving through valleys.

### **Armor in Afghanistan**

The Soviet offensive employment of armor in Afghanistan (1979-1988) illustrates the need for close cooperation between infantry and armor in mountain warfare. For years the former Soviet Union touted an offensive mountain warfare doctrine oriented around armored operations. One senior Soviet general stated that tanks could operate in mountains either with combined arms elements or

alone. This overrated role for armor in mountain warfare proved to be a folly.<sup>65</sup>

Afghanistan has both desert and mountainous terrain, with severe extremes in climate and temperature. The Hindu Kush mountain range covers half the country with peaks as high as 7,000 meters. Forty-nine percent of the country is above the 2,000 meter level.<sup>66</sup>

In Afghanistan, the Soviets quickly learned that they could not maneuver along valley floors without first securing the heights along the route.<sup>67</sup> Tanks without infantry protection were extremely vulnerable to ambush by the Mujahedin (Afghan rebels). Even when armored fighting vehicles (BMPs or BTRs) were in support, tanks did not often receive adequate protection. Soviet infantrymen showed an unwillingness to dismount and close with the Mujahedin occupying commanding heights in the rugged mountainous terrain. Tanks and armored fighting vehicles often were unable to provide effective direct fire support to dismounted troops due to mechanical restrictions in elevating their main guns. This was a clear observation from the Soviet attack on Paghman in 1980.<sup>68</sup> Supporting artillery also had a reduction in accuracy due to shifting mountain winds.<sup>69</sup>

In response, the Soviets began de-emphasizing the role of tanks. When used, tanks had motorized rifle squads assigned to protect them against anti-tank weapons and mines. The use of engineers and mortars increased to aid in mobility and fire support. Envelopment operations in restrictive terrain, conducted by air assaulted troops, also increased. Heliborne enveloping units would secure the commanding terrain along main routes of advance or to the rear of

the enemy. Armor supported both mechanized and dismounted infantry operations in the valleys.<sup>70</sup>

Soviet logistical problems in mountainous terrain were worse than their tactical ones. Soviet armored forces suffered from vehicle breakdowns, inadequate preventive maintenance, and poor driving skills. Most Soviet equipment losses were due to mechanical breakdowns, not combat. Due to the high altitude, fuel consumption rates were seventy to ninety percent higher for gasoline and thirty to forty percent higher for diesel than in Europe. The high altitude decreased helicopter loads by twenty-five percent.<sup>71</sup>

The Soviets began to emphasize more effective logistical planning for armored forces in mountainous terrain. To decrease vehicle problems, wheeled and tracked vehicle operators received special driver training. This training included vehicle maintenance, ascending and descending steep slopes, and methods of fording streams. To keep ground lines of communication (LOCs) open the Soviet Army used fortified security posts manned by motorized rifle troops and combat engineers. Despite these efforts, the Soviets still relied heavily on air transport for supply due to the interdiction of roads, rail, and pipelines by the Mujahedin.<sup>72</sup>

Overall, Soviet operations in Afghanistan showed the need for close armor-infantry cooperation in mountains. Without infantry support, armored forces in mountainous terrain are extremely vulnerable. Additionally, detailed logistical planning is necessary to conduct successful offensive armor operations in mountains.

### Observations from History

There are many historical observations for the offensive employment of armored forces in mountainous terrain. Historical tactics, techniques, and procedures combined with theory may have relevance today. Combined arms teams consisting of infantry, armor, aviation, artillery, engineers, and scouts are essential to successful offensive operations in mountainous terrain.<sup>73</sup> Light infantry and armor are both important, however, neither can effectively operate alone over extended periods against a combined arms enemy in mountains or any other terrain.

Engineers are especially important in mountainous terrain. Armor cannot operate in mountains without engineer support. Engineers are essential for bringing tanks through 'impassable' terrain, obstacles, bad roads, and poor trails. Road construction engineers with bulldozers, road graders, and other equipment are also valuable assets.

Accurate and dependable reconnaissance is a necessity. The search for weak spots in enemy defenses and the need to determine routes of advance places a great emphasis on reconnaissance.<sup>74</sup> Finding a trafficable route through 'impassable' terrain can unhinge an enemy's defense by threatening an enemy's line of communication or line of retreat. This reinforces the theories of both Clausewitz and Jomini. Historically, maps and even aerial photographs do not always pick up faint, but important routes through mountainous areas. Reconnaissance elements should include engineers.

Direct and indirect fire support in mountains is generally less effective than in normal terrain because rocks and cliffs provide much natural cover for enemy defenders. Occupying heights to fire down on the enemy is advantageous even though slopes limit grazing fire and create large dead spaces. Thus, weapons with a high angle of fire such as mortars, field artillery, and grenade launchers take on an added importance.<sup>75</sup>

When road-bound, tanks must operate on a very narrow front when firing. Depending on the terrain, normally only two to five tanks can effectively fire from mountain roads to support forward deployed infantry units. Due to the vulnerability caused by restrictive terrain, commanders should employ a portion of these tanks as 'wingman tanks' to overwatch the firing tanks providing infantry support.<sup>76</sup>

Many successful operations in mountainous areas have occurred when the attacker used several routes simultaneously.<sup>77</sup> This certainly supports Clausewitz's theory of offensive mountain warfare. However, mutual support between units on several routes is difficult due to the compartmentalized terrain.<sup>78</sup> A heavy force needs a minimum of two routes to conduct an attack in mountains. Tank support will be unreliable unless there is at least one alternate route or terrain suitable for use off the road to deploy or conduct logistical operations. Without an alternate route, the disabling of one tank at a critical point can stop an entire armored attack.<sup>79</sup>

Recovery of disabled tracked vehicles is a significant problem in mountain warfare. The very act of positioning recovery vehicles to pull out a vehicle that has slid off a narrow mountain road can take



hours. Establishing unit maintenance control points (UMCPs) at battalion or lower frequently will be impossible due to the physical inability to find enough ground space or a suitable area.<sup>80</sup>

Leaders must closely manage limited off-road areas. The tactical operations center (TOC), artillery units, aid stations, air defense artillery, battalion trains, and other supporting units will compete for limited space in restrictive mountain areas.<sup>81</sup>

Offensive operations in mountainous terrain places a higher than normal strain on the logistical system. In mountains the time distance factor is greater than in warfare over open terrain.<sup>82</sup> Historically, mountainous terrain has had a two-fold effect on logistical requirements: (1) an increase in demand for supplies and (2) a significant restriction on the transportation of supplies. Evacuation of wounded soldiers is also a problem in mountains. Air evacuation is a possible solution.<sup>83</sup>

Plan for both military operations in urban terrain (MOUT) and river crossing operations when attacking in mountains with heavy forces. Historically, armored forces, due to their heavy reliance on road networks in mountainous terrain, must also operate in built up areas. Stream and river crossing operations are also common to heavy units operating in mountains valleys due to nonexistent or inadequate bridges.

## **V. ANALYSIS**

Historical precedence shows a distinct role for the heavy battalion task force in offensive operations in mountainous terrain.<sup>84</sup>

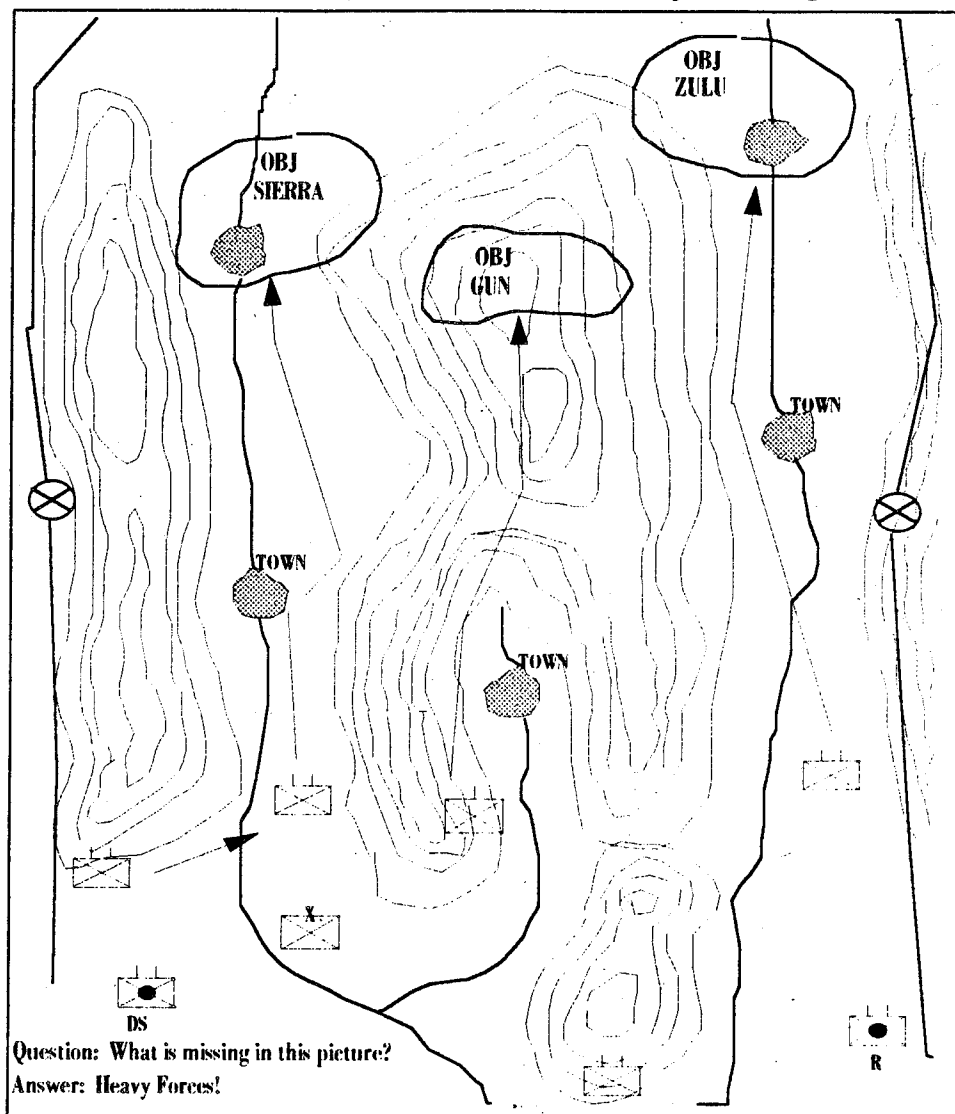
However, a review of the U.S. Army's doctrinal manuals reveals a lack of analysis concerning the use and implications of armored forces in mountainous terrain. An analysis using the elements of combat power from 100-5 (maneuver, firepower, protection, and leadership) will determine specifically why they are inadequate.<sup>85</sup>

### Maneuver

Positional advantage can be decisive in mountain warfare. Effective mountain operations must emphasize the movement of combat forces to gain positional advantage over the enemy. Maneuver is the means of positioning forces at decisive points to achieve surprise, psychological shock, physical momentum, massed effects, and moral domination.<sup>86</sup> If used properly, heavy forces can be important maneuver assets in mountainous terrain.

The army's manual for mountain operations, FM 90-6, devotes only one paragraph to maneuvering with heavy forces. Though only one paragraph in a 140 (+) page manual, this paragraph implies a critical issue.<sup>87</sup> The use of armored forces can gain positional advantage. It specifically mentions the importance of engineers to construct and prepare routes. It also touches upon the importance of reconnaissance when using heavy forces. Unfortunately, that is all that the manual mentions about the friendly use of armored forces. However, the manual devotes nearly two pages to the potential use of tanks by enemy forces in mountains.<sup>88</sup> Mountain Operations also fails to address the historical linkage between mountain operations and military operations in urban terrain (MOUT) and river crossing operations.

In its section entitled "How to Attack in Mountains," FM 90-6, Mountain Operations, depicts examples of how to attack showing a light infantry brigade consisting of four light infantry battalions and a ranger company conducting a movement to contact. The terrain in the brigade's zone consists of two valleys separated by mountains that are impassable to track or wheeled vehicles. There are towns and trafficable road nets depicted in each valley (see Figure 3).<sup>89</sup>



**Figure 3: Example from FM 90-6 of Light Infantry Battalions Attacking Abreast to Seize Brigade Objectives.**

In the examples given, no mechanized or armored forces are depicted, even though a road network and trafficable valley is shown. A heavy battalion task force with a light infantry company attached in support of the light infantry brigade would be very effective in this example.

If the examples of "how to attack in mountains" in FM 90-6, Mountain Operations, did not include valleys, towns, and two separate road networks then an attacking force consisting solely of light infantry units would be appropriate. However, based on historical precedence, a heavy battalion task force could complement and provide effective support to the light infantry brigade. The authors of Mountain Operations miss a great opportunity to demonstrate the use of a combined arms force in offensive mountain operations. A fixation to use only light infantry units without armored support is consistent throughout the manual.

FM 71-2, The Tank and Mechanized Infantry Battalion Task Force, states that the battalion task force must be able to fight on any type of terrain and during adverse weather conditions.<sup>90</sup> It addresses mountain operations in only a single paragraph. The paragraph basically states that mountainous terrain requires some changes in tactics and techniques. However, this manual does not elaborate on how to conduct these modified tactics and techniques.

To plan for a heavy battalion task force maneuver in mountains, commanders will need some specific information requirements. Commanders must determine if all armored and wheeled vehicles in a heavy task force can traverse winding mountain roads with steep slopes. The M1A1 tank, for example, can move up a road with a

sixty percent slope at a maximum speed of seven kilometers per hour.<sup>91</sup> What about movement at a gradient greater than sixty percent? What percent slope is prohibitive for tanks, Bradleys, and other task force vehicles? Based on the vehicle weight and ground pressure of Bradleys and tanks, what types of roads and trails are not trafficable? FM 71-2, The Tank and Mechanized Infantry Battalion Task Force, does not address these kinds of questions and issues.

Another manual, FM 71-123, Tactics and Techniques for Combined Arms Heavy Forces, claims to bridge the "how to" void between FM 71-2, The Tank and Mechanized Infantry Battalion Task Force, and mission training plan (MTP) manuals. The manual purports to present considerations and techniques to make planning, preparation, and execution easier.<sup>92</sup> This manual does not specifically discuss the battalion task force in mountainous terrain. However, its section on heavy and light force integration provides planning considerations and limitations for heavy/light operations in restrictive terrain.<sup>93</sup> The manual also recommends a movement formation for a heavy battalion task force conducting a movement to conduct in compartmentalized terrain.<sup>94</sup>

The incorporation of theory and history into current tactics, techniques, and procedures varies. The importance of engineers and a thorough reconnaissance for a light force is included in Mountain Operations. However, this is not adequate because it does not consider heavy forces. Many of the engineer and reconnaissance requirements for a heavy force are different than for a light force in such areas as road trafficability, bridge classification, and road repair. The advantages and disadvantages of moving a heavy force

along several routes against a concentrated enemy or conducting a penetration against an extended defense in mountains is also not discussed. However, the utility of securing heights before moving through valleys is discussed.<sup>95</sup> Overall, current tactics, techniques, and procedures do not adequately address a maneuver role for a heavy battalion task force in mountainous terrain.

### **Firepower**

Effective firepower provides destructive force. Firepower is essential to defeating an enemy's ability and will to fight in mountain warfare. Synchronizing effective firepower in mountainous terrain is difficult.

FM 71-2, The Tank and Mechanized Infantry Battalion Task Force and FM 71-123, Tactics and Techniques for Combined Arms Heavy Forces discuss the synchronization of both direct and indirect fires in offensive operations in open and rolling terrain. Many of these basic methods apply to mountainous terrain. FM 90-6, Mountain Operations effectively covers the use of attack helicopters, TACAIR, field artillery, mortars, and grenade launchers as fire support assets in mountainous terrain.<sup>96</sup> However, Mountain Operations ignores the direct fire support potential of tanks and Bradleys in the offense.

An inherent weakness of light infantry is its lack of direct firepower. Helicopters are a significant firepower asset in mountainous terrain and should be combined with armor forces. Ignoring the firepower potential of armored forces ignores historical observations.

One can make a credible argument that direct fire support must be as mobile as the force it supports. Armored vehicles are not as mobile as light infantry in restrictive mountainous terrain. However, when there are roads and trails available, tanks and Bradleys can provide lethal and accurate direct fire support.

The M1A1 tank's 120mm main gun cannot elevate more than (+) twenty degrees or depress less than (-) ten degrees.<sup>97</sup> This will affect the forward employment of M1A1 tanks against enemy forces positioned at high altitudes to the tank's immediate front. Tanks in this situation must fire further to the rear to allow main guns to engage targets at higher altitudes. The historical observation of using supporting tanks or 'wingman tanks' to overwatch firing tanks in restrictive mountainous terrain is not included in current manuals. The ability of the Bradley 25mm main gun to elevate higher than the M1A1 tank allows the Bradley to provide close-in direct fire support in mountainous terrain. Current tactics, techniques, and procedures ignore armor main gun elevation and depression in offensive operations in mountains.

The type of main gun ammunition used by tanks and Bradleys can make a difference in mountainous terrain. An M1A1 tank can carry forty 120mm main gun rounds. The M1A1 carries both SABOT (tank killing) rounds and HEAT (high explosive anti-tank tracer) rounds. The M1A1 tank average mix of tank rounds in an armor heavy Central European area of operations is twenty-seven to thirty SABOT rounds and ten to thirteen HEAT rounds.<sup>98</sup>

Commanders should revise the SABOT to HEAT mix when operating in mountainous terrain due to the threat of enemy bunkers

and fortified defensive positions. A tank equipped mainly with SABOT rounds is of little use against enemy bunkers. Additionally, the 120mm HEAT round can defeat most known enemy tanks that are not equipped with add-on armor.<sup>99</sup> A tank main gun mix for mountains should be around eight SABOT and thirty-two HEAT rounds. Similarly, the Bradley should have a mix of four to one HEI (high explosive incendiary) versus SABOT 25mm rounds in offensive mountainous operations. Current tactics, techniques, and procedures do not address this issue either.

Current tactics, techniques, and procedures provide for indirect fire support, TACAIR, and helicopter support for infantry in mountains. However, the direct fire support potential of armored forces is ignored. Technical considerations such as gun tube elevation and ammunition for offensive armored mountain combat are not included. Overall, current tactics, techniques, and procedures do not adequately address the integration of heavy and light force firepower in offensive operations in mountainous terrain.

### **Protection**

Protection is especially critical in mountain combat due to the restrictive nature of the terrain. Protection preserves the fighting force so that commanders can apply combat power at the decisive place and time.<sup>100</sup> Protection includes maintenance (personnel and equipment), security, deception, and logistics.

FM 90-6, Mountain Operations, addresses the environmental effects (both physiological and psychological) on personnel in mountains. The manual also addresses the effects of the mountain environment on wheeled vehicles and equipment such as radios.<sup>101</sup>



The manual, however, does not discuss the effects of the environment on armored vehicles.

Security of heavy forces in offensive mountain combat is an ever present problem. Long armored columns moving along a single route of approach gives a defending enemy an opportunity to strike the flanks of an advancing force. Many of the security measures discussed in FM 71-123, Tactics and Techniques for Combined Arms Heavy Forces such as dismounted patrols, operations security (OPSEC), and employment of an advanced guard are also applicable to mountain warfare.

A weakness of current tactics, techniques, and procedures is the failure to address special logistical considerations for heavy forces in mountain terrain. Basic logistical principles are the same, but the application and techniques will be different in mountains. A heavy battalion task force operating in mountainous terrain will experience an increase in demand for supplies and restrictions on the transportation of supplies.

There are two reasons for the increased demand for resupply. First, fuel consumption will significantly increase due to the altitude and steep slopes. Second, the restrictive terrain will inflict greater wear on tires and tracks, making replacement more frequent.

Mountainous terrain severely restricts the transportation of supplies. Some mountainous areas may only have one single available route. Sometimes no roads exist and the engineers must construct an entire supply route.<sup>102</sup> This increases engineer Class IV materials such as construction items, bending material, and bridging assets. Even where roads exist, it is often so narrow that only one

way traffic is allowable. One way roads may force supply vehicles to make long and circuitous trips. Air transported supplies is only a partial solution for heavy forces.<sup>103</sup>

FM 90-6, Mountain Operations gives a general view of combat service support operations in mountains by addressing supply, transportation, and health services for a light unit in mountainous terrain. Unfortunately, Mountain Operations does not address the large volume of logistical support necessary to sustain a heavy battalion task force in mountains. Current tactics, techniques, and procedures for the heavy battalion task force also do not address special maintenance requirements such as recovery of disabled track vehicles on narrow mountain roads, establishment of unit maintenance collection points (UMCPs) in limited terrain, and the increased demand for additional Class IX repair parts. Both FM 71-2, The Tank and Mechanized Infantry Battalion Task Force and FM 71-123, Tactics and Techniques for Combined Arms Heavy Forces fail to address special CSS requirements for the heavy battalion task force in restrictive or mountainous terrain.

### **Leadership**

Heavy battalion task force leaders must prepare for the unique requirements and characteristics of mountain warfare. The compartmentalized nature of mountainous terrain divides the battlefield into isolated conflicts which are difficult to coordinate. It will be necessary for brigade and task force commanders to decentralize control over subordinates. Particularly when company teams deploy in parallel columns, for they are seldom mutually

supportive. This requires a high degree of leadership, initiative, and determination on the part of subordinate commanders.

FM 71-123, Tactics and Techniques for Combined Arms Heavy Forces addresses procedures to coordinate heavy and light forces. However, the manual does not address the decentralized nature of command and control in mountainous terrain.<sup>104</sup> FM 90-6, Mountain Operations addresses other command and control problems such as degraded effectiveness of radios, the usefulness of airborne retransmission platforms, and the need for detailed standard operating procedures (SOPs). Mountain Operations also addresses leadership problems associated with controlling independent and semi-independent light units in mountainous terrain.<sup>105</sup>

How do leaders successfully integrate maneuver, firepower, and protection in mountainous terrain? This is a missing link in current tactics, techniques, and procedures. Many of the techniques and procedures detailed in current manuals are certainly applicable. However, current manuals do not address historical observations such as the command and control of armored forces in compartmentalized terrain and terrain management of limited space in mountainous terrain.

## **VI. CONCLUSIONS AND IMPLICATIONS**

The theoretical fundamentals of offensive operations in mountainous terrain remain virtually unchanged. Clausewitz and Jomini's belief that the success of an attacker lies in penetrating mountain defensive positions and attacking a defender's line of

retreat or line of communication still has validity today. A heavy battalion task force can create penetrations and conduct envelopments to cut a defender's line of communication.

The historical use of heavy forces in mountains shows a viable role for armor in this terrain. Terrain requires employment of several columns spread out like fingers of a hand, all columns moving in one direction on a broad front, which supports theory. Each column probes for a weak point. Each column has enough combat power to exploit any breakthrough, taking advantage of the high ground and then pouring through the hole, to converge upon decisive points. This takes optimal advantage of the inherent flexibility, mobility, and shock effect of combined arms teams. Infantry provides close in support, points out suitable targets and may even lead tanks through difficult terrain. Tanks give infantry direct fire support and anti-tank protection. Engineers aid in mobility.<sup>106</sup>

Current tactics, techniques, and procedures ignore historical lessons and observations in the use of heavy forces in mountains. The importance of reconnaissance and engineers in armored offensive operations in mountains is largely ignored. The linkage of armored operations in mountains with military operations in urban terrain (MOUT) and river crossings is not discussed. The direct fire support role of armored forces is discounted. The special combat service support requirements for armored forces in mountainous terrain is also not included. These are just a few examples of voids in U.S. Army manuals for the offensive employment of a heavy battalion task force in mountains. An analysis based on the elements

of combat power from FM 100-5 (maneuver, firepower, protection, and leadership) in Section V illustrated the inadequacy of current tactics, techniques, and procedures for heavy forces in mountains and their failure to integrate combined arms assets.

Employing a heavy force in mountainous terrain is difficult. Employing a heavy battalion task force in mountains without adequate tactics, techniques, procedures, and proper training is not only difficult, but invites failure. This does not mean, however, that operational planners should avoid using armored forces in offensive contingency missions to mountainous areas.

Such a decision must involve an assessment of enemy capabilities. A light infantry force is certainly easier to deploy to a mountainous region, but once it arrives, then what? A brief look at the military forces in mountainous countries such as the former Yugoslavia, Iran, Syria, and North Korea reveals a significant armor threat.<sup>107</sup> Serbia, alone has over six hundred tanks.<sup>108</sup> To meet this threat, heavy battalion task forces could deploy as a part of any U.S. contingency ground force to conduct offensive operations. However, the U.S. Army has a significant void in its tactics, techniques, and procedures for the employment of heavy forces in mountainous terrain. Sending unprepared heavy forces into combat in mountainous terrain would be a travesty. What then must be done to prepare the heavy battalion task force to fight in mountainous terrain?

Based on the analysis, three dominant conclusions are found. First, the U.S. Army must update current tactics, techniques, and procedures to include the heavy battalion task force in mountainous

terrain. Second, a viable heavy/light battalion task force organization must be developed. Lastly, the application of updated tactics, techniques, and procedures by a heavy battalion task force in realistic mountain training is necessary.

Special considerations for mountain operations need to be included in the Army's doctrinal manuals for the heavy battalion task force. A greater emphasis on the role of heavy forces needs to be included in the Army's manual for mountain operations, FM 90-6. Of the greatest significance is the integration of heavy and light forces in mountainous terrain throughout the manual. Updated tactics, techniques, and procedures will have an impact on the organization of heavy battalion task forces.

A viable heavy/light battalion task force organization for operations in mountainous terrain is needed. Based on the analysis, increased logistics and fuel haul capability are needed. Increased engineer assets with significant road repair and bridging assets are required. Additional ground and air reconnaissance elements at brigade level would assist heavy battalion task force intelligence requirements. Air and ground mobile retransmission systems are also needed. Dismounted infantry with mortars completes the additions to the heavy battalion task force organization (see Appendix A).

The application of heavy/light task force tactics, techniques, and procedures in realistic mountain training is necessary. Heavy/light and light/heavy rotations at combat training centers (CTCs) need continued emphasis and should include operations in restrictive or mountainous terrain. Due to the tactical and logistical difficulties

involved, many commanders in peacetime prefer not to conduct heavy and light integrated CTC rotations.<sup>109</sup>

Training in actual mountains is desirable. Areas within the National Training Center (NTC) may be adequate for this. Other areas such as Pinion Canyon at Fort Carson, Colorado and training areas in South Korea may also be adequate. Deploying heavy/light units to work with Allies in mountainous areas such as Norway, Italy, Greece, and Turkey is a possible option. Simulations using mountainous terrain scenarios provide an additional option. Realistic training for offensive mountain operations involving the heavy battalion task force should also include military operations in urban terrain (MOUT) and stream/river crossing training.

Adopting these three recommendations will increase the chances of success for a heavy battalion task force with a mission of attacking in a mountainous region such as the former Yugoslavia. Successful operations in mountainous terrain may one day result in a future defeated enemy telling U.S. Army commanders what the Chief of Staff of the German Fourteenth Army told American commanders in Italy:

The Allied offensive was well planned and artfully executed; troops fought well. In particular, armored formations repeatedly bypassed our strong points in the mountains. We never knew on which trail or road they would appear. Often they came over terrain which we considered impassable to armor, and would suddenly be at our flanks.<sup>110</sup>

In a future crisis in a mountainous region, the U.S. is likely to deploy heavy forces. As such, heavy forces must be prepared to fight and win upon arrival. Army leaders must work now to ensure that tactics, techniques, and procedures for the offensive employment of a heavy battalion task force in mountainous terrain are both adequate and applicable.



## ENDNOTES

1 U.S. Department of Defense, Pamphlet No. 2600-6408-93. Former Yugoslavia Handbook (Washington D.C.: U.S. Government Printing Office, 1993), 2.

2 U.S. Department of the Army, Field Manual 90-6, Mountain Operations (Washington, D.C.: U.S. Government Printing Office, June 1980, 3-4.

3 Louise Lief, et al., "What Went Wrong in Somalia?" U.S. News and World Report, Vol. 115, No. 15 (18 October 1993), 32. On 3 October 1993, fifteen U.S. soldiers were killed, seventy-seven were wounded and one was captured after a bungled raid against the Somali warlord, Mohammed Farah Aidid. Senior American military officials stated that many of the casualties could have been prevented if U.S. armored forces had been in country to support the operation. Within days of the debacle, a heavy battalion task force from Fort Stewart, Georgia was alerted to deploy to reinforce American forces in Somalia.

4 U.S. Department of the Army, Field Manual 100-5. Operations (Washington, D.C.: U.S. Government Printing Office, 1993), 2-10 to 2-12. According to FM 100-5, four primary elements --- maneuver, firepower, protection, and leadership --- combine to create combat; the ability to fight. Their effective application and sustainment, in concert with one another, will decide the outcome of battles and engagements. Maneuver is defined as the movement of combat forces to gain positional advantage to deliver or threaten to deliver direct and indirect fires. Maneuver is rarely effective without firepower and protection. Firepower provides destructive force. Firepower is essential in defeating both an enemy's ability and will to fight. Protection is the ability to conserve the fighting potential of a force so that commanders can apply combat power at decisive points in time and space. The most essential element of combat power is competent and confident leadership. Leaders must

integrate maneuver, firepower, and protection capabilities in a variety of combinations appropriate to the situation.

5 U.S. Department of the Army, Field Manual 90-6. Mountain Operations, 1-4.

6 Larry D. Bruns, "Threat Theory: A Model for Forecasting the Threat Environment of the Future." (School of Advanced Military Studies Monograph, U.S. Army Command and General Staff College, 1993), 39-41. The list of potential crisis spots in the nation-state category includes the former Soviet Union, Libya, South Africa, Cuba, Iran, Iraq, Syria, China, North Korea, Japan, Vietnam, and India. Crisis spots in the non-nation state category include areas of religious strife (Lebanon and the former Yugoslavia are examples), drug cartels (Northwestern South America is an example), and areas with mass population migrations (the movement of Eastern Europeans into Western Europe is an example). All of the crisis areas listed have at least some mountainous terrain.

7 FM 90-6. Mountain Operations, 1-4.

8 Ibid., 1-4.

9 Ibid., 1-5.

10 Ibid., 1-5.

11 Gerhard Schepe, Mountain Warfare in Europe (Kingston, Canada: Centre for International Relations, Queen's University, 1983), 24.

12 FM 90-6, Mountain Operations, 1-6.

13 Bruns, 39-41. Potential U.S. enemies are derived from Brun's model for forecasting the future threat environment. The armor capability of potential U.S. enemies in mountainous terrain is taken

from the International Institute for Strategic Studies' The Military Balance 1993-1994 (London: Brasseys Ltd., 1993), 33-105.

14 Schepe, 9.

15 Antoine Henri Jomini, The Art of War, a condensed version edited by J.D. Hittle in Roots of Strategy Book 2 (Harrisburg, PA: Stackpole Books, 1987), 488.

16 Ibid., 485.

17 Ibid., 488.

18 Carl von Clausewitz, On War, Translated and edited by Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976) 420.

19 Ibid., 538.

20 Ibid., 539.

21 Schepe, 12.

22 Ibid., 18.

23 U.S. Department of the Army, Pamphlet No. 20-243, The German Campaign in the Balkans (Washington D.C.: U.S. Government Printing Office, August 1954), 112.

24 Ibid., 112.

25 F.W. Mellenthin, German Generals of World War II, As I Saw Them (Norman, Oklahoma: University of Oklahoma Press, 1977), 199.

- 26 Pamphlet No. 20-243, The German Campaign in the Balkans, 98.
- 27 F.W. Mellenthin, Panzer Battles Translated by H. Betzler, edited by L.C.F. Turner (Norman, Oklahoma: University of Oklahoma Press, 1977), 34.
- 28 Mellenthin, Panzer Battles, 34.
- 29 U.S. Department of the Army, Pamphlet No. 20-243, 98.
- 30 Mellenthin, Panzer Battles, 34.
- 31 Mellenthin, German Generals of World War II, As I Saw Them, 200.
- 32 U.S. Department of the Army, Pamphlet No. 20-243, 98.
- 33 Mellenthin, Panzer Battles, 34.
- 34 U.S. Department of the Army, Pamphlet No. 20-243, 100.
- 35 Mellenthin, Panzer Battles, 35.
- 36 Mellenthin, German Generals of World War II, As I Saw Them, 200.
- 37 Mellenthin, Panzer Battles, 35.
- 38 Ibid., 35.
- 39 Pamphlet No. 20-243, The German Campaign in the Balkans, 100.

- 40 Mellenthin, Panzer Battles, 36.
- 41 Mel I. Werds, The Other Side of the Hill, War History Branch, Department of Internal Affairs (Wellington, New Zealand, 1952), 8.
- 42 Henry Frankel et al, "Armor in Mountain Warfare," (Armor Officer Advanced Course, U.S. Army Armor School, 1950), 103.
- 43 R.K. Gottschall, "Mountain Goat M4," The Cavalry Journal, Vol LIV No.1 (Jan-Feb 1945), 29.
- 44 Curry N. Vaughn et al, "Mud, Mountains, and Armor," (Armor Officer Advanced Course, U.S. Army Armor School, 1950), 38.
- 45 Ibid., 38. Combat Command B for this operation consisted of the 2d and 3d Battalions, 6th Armored Infantry Regiment; 1st (Medium) and 2d (Light) Battalions, 13th Armored Regiment; C Co., 701st Tank Destroyer Battalion; A Co., 16th Armored Engineer Battalion; and the 68th and 69th Armored Field Artillery Battalions. C Troop, 91st Reconnaissance Squadron was attached to on Combat Command B on 24 June 1944.
- 46 Gottschall, 29.
- 47 Ibid., 29. Defending against the 1st Armored Division, including Combat Command B's zone, the German Army employed a tank battalion of Mark IV tanks and a battalion of fifty Mark VI (Tiger) tanks. The German 162d Infantry Division was the main enemy force in zone and was reinforced by self-propelled guns.

48 Vaughn, 40.

49 Ibid., 42-43.

50 Ibid., 43.

51 Gottschall, 31. Vaughn, 43-44. The loss of 12 light tanks and four tank destroyers was the greatest single day loss during the operation for Combat Command B.

52 Vaughn, 43, and Gottschall, 31.

53 Gottschall, 31.

54 Ibid., 31. Most of 1st Armored Division's heavy artillery was concentrated in Combat Command B's zone. The two attached armored 155mm field artillery battalions were used primarily as indirect fire anti-tank guns. Each time a German Mark VI (Tiger) tank was located, the fire of the two artillery battalions and the Combat Command's organic 105mm artillery battalion would be used to destroy or damage the tank. This was an expensive tactic with regard to ammunition. However, it was a method of destroying the superior Tiger tank without heavy loss of U.S. personnel and equipment.

55 Vaughn, 46.

56 Ibid., 47. After withdrawing a few kilometers, the German force turned to fight the right task force again. A six-hour engagement north of Perolla ensued. The fight ended after the

German tanks withdrew and the right task forces' remaining light tank platoon overran the German infantry position.

57 Ibid., 48.

58 Gottschall, 31.

59 Ibid., 32.

60 Vaughn, 51.

61 Ibid., 53.

62 Gottschall, 32. Vaughn, 53.

63 Vaughn, 53. Gottschall, 32. Making its own roads, the tank company passed to the east side of a 1800 ft. peak to reach Sasso.

64 Gottschall, 32.

65 Larry A. Briskey, Soviet Ground Forces in Afghanistan: Tactics and Performance, unpublished graduate paper (Georgetown University, 1983) 5.

66 FM 90-6. Mountain Operations, G-12.

67 Michael R. Matheny, "Armor in Low-Intensity Conflict (LIC): The Soviet Experience in Afghanistan," Armor 97 (September-October 1988) 6-11.

68 Aernout Van Lyndon, "Soviets Change Tactics Against Afghan Rebels," Washington Post (27 December 1982) A-26. The town of Paghman, fifteen miles northwest of Kabul, was the scene of a three day battle between Soviet-supported forces and the Mujahedin. Soviet tanks and BMPs initially made headway over the mountainous terrain. However, only a few infantry units supported the armored forces. The Soviet infantry failed to close with the enemy. The Mujahedin roamed with impunity throughout the battlefield in small groups, armed with RPG-7s and anti-tank grenades. Despite making a significant advance, by the third day, the Soviets were forced to withdraw their armor.

69 Aaron A. Davis, "Afghanistan Revisited: Soviet Lessons Learned," Military Intelligence 16 No. 4 (October-December 1990) 29-35.

70 Ibid., 32.

71 Ibid., 32.

72 Ibid., 32.

73 Vaughn, 157.

74 Frankel, 33.

75 Schepe, 7.

76 G.B. Devore, 760th Tank Battalion Commanders Report on the Battle of Cassino (Mediterranean Theater of Operations United States Army, Army Ground Forces Board, March 1944) 6.



77 Frankel, 32.

78 Vaughn, 158.

79 Devore, 2.

80 Frankel, 11 and 17.

81 Ibid., 17.

82 Ibid., 98.

83 Ibid., 19.

84 U.S. Department of the Army, Field Manual 71-2, Tank and Mechanized Infantry Task Force Operations (Washington, D.C.: U.S. Government Printing Office, September 1988), 1-3. A heavy battalion task force is a unit organized by combining tank and infantry elements under a single battalion commander. Heavy battalion task forces combine the effects of their company teams and combat support to perform tactical missions as a part of a brigade or division.

The brigade commander determines the mix of companies in a task force. A brigade commander can task organize battalion task forces by cross-attaching tank and mechanized infantry companies between battalions within the brigade. Normally, cross-attachment is done at battalion level because battalions have the necessary command and control and support capabilities to employ combined arms formations. The task force commander can cross-attach platoons to form one or more company teams for specific missions.

The brigade commander routinely augments the battalion task force with engineer, fire support, air defense, intelligence, and combat service support to improve its capabilities.

The heavy battalion task force applies its mobility, firepower, and shock effect to conduct sustained operations in all environments. Its capabilities include conducting offensive operations, defensive operations, and security missions. The heavy battalion task force can conduct rapid movement and limited penetrations. Additionally, the heavy battalion task force exploits success and can pursue a defeated enemy as a part of a larger formation.

A limitation of the heavy battalion task force is its many tracked and wheeled vehicles. Urban areas, dense jungles, and forests also restrict its mobility and firepower. Very steep and rugged terrain, as well as significant water obstacles are limitations.

85 FM 100-5. Operations, 2-10 to 2-12.

86 Ibid., 2-10.

87 FM 90-6. Mountain Operations, 3-4.

88 Ibid., 3-9 to 3-10.

89 Ibid., 3-12 to 3-15.

90 FM 71-2, The Tank and Mechanized Infantry Battalion Task Force, 1-14.

91 U.S. Department of the Army, M1/IPM/M1A1 Comparison. student handout, (Warren, Michigan: U.S. Army Tank Automotive Command, December 1987), 1-3.

92 U.S. Department of the Army, FM 71-123, Tactics and Techniques for Combined Arms Heavy Forces (Washington D.C.: U.S. Government Printing Office, June 1991), iii.

- 93 Ibid., B-5 through B-10.
- 94 Ibid., 3-104.
- 95 FM 90-6, 3-2.
- 96 FM 90-6, Mountain Operations, 4-1 through 4-6, D-1 through D-2.
- 97 M1/IPM1/M1A1 Comparison, 1-6.
- 98 The official designation for a SABOT round is APFSDS-T (armor-piercing, fin stabilized, discarding sabot tracer). The ammunition information is derived from the author's experience with the U.S. Army in Europe (USAREUR) from 1985 to 1992. While in USAREUR the author served in the 11th Armored Cavalry Regiment, the Berlin Brigade, 1st Armored Division, and the 3d Infantry Division (Mechanized). Most armor units in USAREUR uploaded with a two to one or a three to one mix of SABOT vs. HEAT main gun tank ammunition due to the perceived armor threat from the Warsaw Pact.
- 99 David Eshel, "Thoughts on Modern Gunnery Techniques," Military Technology, 13 No. 10 (October 1989), 146.
- 100 FM 100-5, Operations, 2-10.
- 101 FM 90-6, Mountain Operations, 1-9 through 1-17.
- 102 Frankel, 9.

103 Frankel, 9.

104 FM 71-123, Tactics and Techniques for Combined Arms Heavy Forces, B-1 through B-28.

105 FM 90-6, Mountain Operations, 3-8.

106 Frankel, 95-97.

107 The Military Balance 1993-1994, 46-103.

108 Ibid., 65.

109 The comment on the reluctance of battalion commanders to conduct heavy and light integrated CTC rotations was made on 30 November 1993 by LTC John P. Lewis during a discussion with students at the School of Advanced Military Studies, Ft. Leavenworth, Kansas. LTC Lewis commanded an American mechanized infantry battalion in South Korea from 1990-1992.

110 The comment was made by German Major General Wolfe Hauser and translated by the U.S. Forces European Theater Historical Division in The Italian Campaign, (November 1947), Chapter 5, Section II.

## **Appendix A : Heavy/Light Battalion Task Force Organization for Mountains**

- Mechanized Infantry or Armor Battalion Headquarters, with a Headquarters Company. Headquarters and Headquarters Company (HHC) includes the battalion's organic Support Platoon, Scout Platoon, Mortar Platoon (107mm mortars), Signal Platoon, Maintenance Platoon, and Medical Platoon.
- Three Company Teams with two mechanized infantry platoons and one tank platoon each. Company Teams with a mechanized infantry company headquarters will have nine Bradley Fighting Vehicles and four tanks. Company Teams with an armor company headquarters will have six tanks and eight Bradleys.
- One Light Infantry Company equipped with its organic mortar section (60mm mortars) and one anti-tank platoon attached. The Light Infantry Company will also receive a truck squad from the truck platoon attached to the task force. Additional maintenance, medical, and mess support must be given to the Light Infantry Company.
- One Anti-tank Company (-) equipped with nine Bradley Fighting Vehicles (BFV's). The Anti-tank Company will only appear in task forces with a mechanized infantry hqs.
- One Heavy Engineer Company with a Horizontal Construction Platoon and a bridging section attached. The additional engineer support will enable the task force to conduct road repairs and limited bridging operations.
- One Air Defense (Stinger) Platoon to provide air defense coverage over multiple mountain and valley routes.
- One Light Truck Platoon equipped with 5-ton trucks to enable the task force to transport the expected increase in demand for supplies in mountain warfare.
- One Signal Platoon from the division signal battalion to assist the battalion task force's ability to communicate in the mountainous environment.
- One Truck Squad from the Transportation Medium Truck Company (POL) from the corps support command (COSCOM). The ability of the squad's 5,000 gallon fuel tankers to keep up with the task force in a mountainous environment is questionable. However, the truck squad will, as a minimum, reduce the local haul times for the task force support platoon.
- One Aerial Scout Platoon placed under the operational control of the battalion task force for special missions.

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